Hematopoietic stem and progenitor cell composition in peripheral blood and in mobilized CD34+ cells harvests.

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Hematopoietic stem and progenitor cell composition in peripheral blood and in mobilized CD34+ cells harvests.

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Introduction: Hematopoietic stem cell transplantation is a procedure now well established, although optimal outcomes are not always achieved. Nowadays, mobilized peripheral CD34+ cells are the preferred source of hematopoietic stem and progenitor cells for transplantation purposes. Unfortunately, very little is known about the peripheral CD34+ cells composition in terms of committed myeloid progenitors and stem cells. In the present study, we intend to investigate the proportions of hematopoietic progenitors and stem cells available in mobilized peripheral blood (PB) and correlate this with clinical information and outcomes of patients who underwent a transplantation procedure.

Materials (or patients) and methods: Multicolor flow-cytometry was used to analyze CD34+ cells from 4 bone marrow (BM) samples and 9 PB samples from healthy volunteers and 32 mobilized PB samples from hematological patients prior CD34+ cell harvesting.

Results: RESULTS: Common myeloid progenitors (CMP) were present in a higher percentage in PB compared to BM (47.8% ± 9.5 versus 27.6% ± 9.5 of CD34+ cells) while granulocyte-macrophage progenitors (GMP) were lower in PB compared to BM (10.3% ± 6.9 versus 23.8% ± 7.2). No significant differences were noticed between PB and BM hematopoietic stem cells (HSC). According to literature, progenitor fractions were equally distributed in BM (27.6% ± 9.5 CMP, 23.8% ± 7.2 GMP and 27.6% ± 16.2 megakaryocyte-erythroid progenitors, MEP). No differences in subpopulations fractions were shown between baseline and mobilized CD34+ cells. Concerning the two samples mobilized with the CXCR4 inhibitor Plerixafor instead of G-CSF only, we noticed that a more elevated ratio of GMP were released in PB: 37.8% in patient#1 and 33.8% in patient#2 compared to the average 16.31% of “G-CSF only” mobilized samples. Analyzing CXCR4 levels among subpopulations of both mobilized or unmobilized samples, it was more expressed on GMP than on the other CD34+ cell subsets.

A strong correlation was observed between the number of peripheral CD34+ cells and the number of circulating CMP whose proportion did not change with increasing CD34+ cell release. White blood cells (WBC) count exhibited a significant correlation with the number of mobilized HSC; on the contrary, WBC, hemoglobin and platelet levels did not show correlations with the number of mobilized CMP/GMP/MEP.

We then looked at possible relationships between the number of re-infused subpopulations and the hematological recovery after an auto-transplantation conditioned by high dose chemotherapy. A tendency to inverse correlation was shown between the number of re-infused progenitors and the days of aplasia, as well as between the number of re-infused MEP and erythrocyte/platelet transfusions. However, these results did not reach a statistical significance, probably for the too low patient number.

Conclusion: CD34+ cell subset composition shows differences between BM and PB. We do not know yet if variabilities in the proportions of different progenitor/stem cell re-infused can influence clinical issues such as infections complications and transfusion requirement in patient undergoing an hematopoietic stem cell transplantation. A deep understanding of these mechanisms may guide the clinician in the choice of the most suitable chemotherapy or mobilizing regimen and lead up to an improved clinical outcomes of such patients.

Disclosure of Interest: None Declared

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